

Greater Umstead East: An Essential Element of the Greater Umstead Ecosystem and the Crabtree Creek Watershed

By Douglas N. Rader, PhD · First Approximation, September 3, 2026

The Upper Neuse Watershed is increasingly under threat as its population soars and lands are intensively developed, especially near the major population centers, including Raleigh and Wake County. Umstead State Park, Schenk Forest and other smaller public and private conservation areas remain critically important elements of the upper watershed but cannot by themselves support the full array of ecosystem-scale functions needed to help sustain ecological integrity in the urban fringe.

Recognizing and protecting the ecological benefits of surrounding portions of this Greater Umstead Ecosystem becomes ever more important with each passing year. Today, rapid growth and proposed intensive development (including the proposed 5000 Duraleigh project) threatens a largely unrecognized and still largely intact semi-urban forest, which we call “Greater Umstead East.” Loss of the core forested lands there would greatly impair the Greater Umstead Ecosystem and the broader Upper Neuse watershed.

Greater Umstead East

Greater Umstead East is an unusual, perhaps unique, area of dense semi-urban and urban forest located in and around the canyon of Crabtree Creek, lying east of Umstead State Park, and acting as a key element of the Greater Umstead Ecosystem (Figure 1). Key elements of this region extend into still heavily forested subdivisions, built from the late 1950s to the early 1970s, including Oak Park, Glen Forest and Laurel Hills. The names “Oak Park” and “Glen Forest” make clear their key forest attributes, now 50 years more mature than at their development. Laurel Hills was named for the profusion of native mountain laurel down the steep slope on the south side of Crabtree Creek, and along both sides of the creek to the east.



Figure 1. Greater Umstead East. Approximate boundaries in red; the core Duraleigh Forest in yellow; 5000 Duraleigh Road parcel (Case Z-35-26) in blue. Umstead State Park on the left; Crabtree Valley Mall on the right. (GoogleEarth)

Duraleigh Forest – shown in yellow – combines mature oak and hickory woods on the crests and steep rocky slopes, grading to mature beech, tuliptree and holly at the foot of the slope, and wet hardwood forests on the floodplain of Crabtree Creek (Figure 2).



Figure 2. Duraleigh Forest rocky hillside above the suspension bridge on the Crabtree West Greenway, in winter showing the mature deciduous forest at 5000 Duraleigh Road.

This important forest still exists largely because of the steep rocky topography, with drops of up to 100 feet and slopes of up to 30%. Over millions of years, Crabtree Creek incised a canyon through the hard metamorphic rocks (notably the 500+ million-year-old Crabtree Creek Gneiss of the Raleigh Belt, the same rock being quarried at the Duraleigh Crabtree Quarry; Figure 3). These high slopes have already hampered soil



Figure 5. Azalea Falls, Duraleigh Forest, south side of Crabtree Creek, showing bedrock exposures. Owned and managed by the City of Oaks Foundation.

Ecologically, Duraleigh Forest is amazing. While, to our knowledge, no rare plant searches have ever been conducted here, this mature upland Piedmont hardwood system is locally rare; its shallow soils and rocky terrain are compatible with rare herbaceous plants. Limited disturbance means that invasive plant problems are only spotty, aside from the disturbed sites downstream near yards where English ivy was planted many years ago, and more recent invasions down in the floodplain (including Japanese stilt grass).

Mammal populations are very high, including a large deer herd, which roams freely from Umstead eastward towards Crabtree Valley, and often beds up on top of the Duraleigh Forest hillcrest, behind Oak Park. Other mammals that are often seen include raccoons, opossums, foxes, coyotes and squirrels. Occasional bear scat has been observed during dispersal seasons.

Duraleigh Forest and Greater Umstead East act as essential extensions of Umstead, Schenk Forest and the forested lower Richland Creek Basin, in terms of ecosystem connectivity for these more mobile species. Fragmentation of this kind of limited habitat is well-known as a key threat to their persistence.



Figure 6. Some Duraleigh Forest residents: Whitetail deer (a), Eastern box turtle (b), and amphibian egg masses from the Duraleigh Forest seep and ephemeral pool (c).

Reptile populations are very high. All our resident snakes occur in abundance, including many fossorial species rarely seen except during gardening in peoples' yards. Box turtles are common, and often seen nesting up in subdivision yards, along with aquatic turtles moving uphill from the creek. Resident lizards are abundant.

The floodplain pools are especially important for amphibians. Many species of frogs and toads breed in the ephemeral pools, as do spotted salamanders. The large-scale seep at the base of the steep section of the Duraleigh Forest heights, just east of the new suspension bridge of the Crabtree West Greenway, is the main breeding area for those animals.

The birds of Duraleigh Forest are truly remarkable. We have been using Cornell University's bird identification app, "Merlin," to document the avifauna of this area for years. Raptor nests are common, including Red-Shouldered Hawk, Cooper's Hawk, Barred Owl and others. Turkey and Black Vultures not only kettle over the quarry, but feed on carrion, including storm-killed white-tailed deer that strand along the creek. Wild turkeys are common, foraging out into surrounding subdivisions. Nesting pileated and other woodpeckers are very common, as are summer tanagers and other resident songbirds.

Probably most important are the seasonal migrants, especially neotropical migratory songbirds that use this habitat as essential foraging stops during migrations. We have documented many species, including some of the most habitat-limited migrants, many warblers and thrushes.

The vast majority of Greater Umstead East is privately held, and mostly zoned R4; all is vulnerable to intensive development. The Duraleigh Crabtree Quarry (now Heidelberg Materials DBA Hanson Aggregates Southeast) is an obvious scar in the forest, with initial operations by Baker Rock and Sand in the late 1940s. The first major intrusion into Greater Umstead East has just occurred, with the RX5-CU rezoning and construction of the MAA Vale apartments and Elm Park townhomes.

Now, the steep rocky heart of Duraleigh Forest (5000 Duraleigh Road) is being assailed for clearcutting and leveling, with large retaining walls and intensive multi-family development (up to 275 apartments). When viewed with the complex at 4800 Duraleigh Road, this development will impose severe bottlenecks in habitat and wildlife movement patterns, in addition to the serious and final damage to on-site and nearby habitats. Grass and ornamental shrubs provide no value to the most at-risk ecosystem elements.

This effect compounds an existing constriction. The development at 4800 Duraleigh Road has already cleared forest along the south-bank escarpment directly across the creek from this site. Should the proposed development at 5000 Duraleigh Road clear the north bank in turn, the creek corridor connecting Umstead State Park to points east would be closed from both sides at once — eliminating one of the last intact crossings for the wildlife movement documented above.

Role in the Greater Umstead Ecosystem

The wonders of Umstead State Park and Schenk Forest themselves are well known and much appreciated. This large-scale Piedmont hardwood ecosystem is a beautiful anomaly, created by the foresight of the federal government and North Carolinians, amplified by adequate time to begin rebuilding its natural attributes and values.

Nearby lands, including the important bottomlands of Lower Richland Creek, are increasingly appreciated by users of the Crabtree West Greenway, which brings thousands of people every year through those areas east of the park. That greenway continues east, across the City of Raleigh's impressive new suspension bridge and through the steep rocky gorge of Crabtree Creek, all the way to the lowlands surrounding Crabtree Valley Mall.

Surrounding natural – and for-the-most-part still lightly used – lands amplify and complete the formally protected portions of the landscape. From satellite photographs, the context is crystal clear. Umstead and Schenk stand out as islands of natural habitat, but with obvious close connectivity to the forests to the east. Most of the westward area is already developed. Together, these areas constitute the Greater Umstead Ecosystem (Figure 7). There are, of course, other residential neighborhoods to the north and northeast of this zone that also drain to Crabtree Creek which add important value.

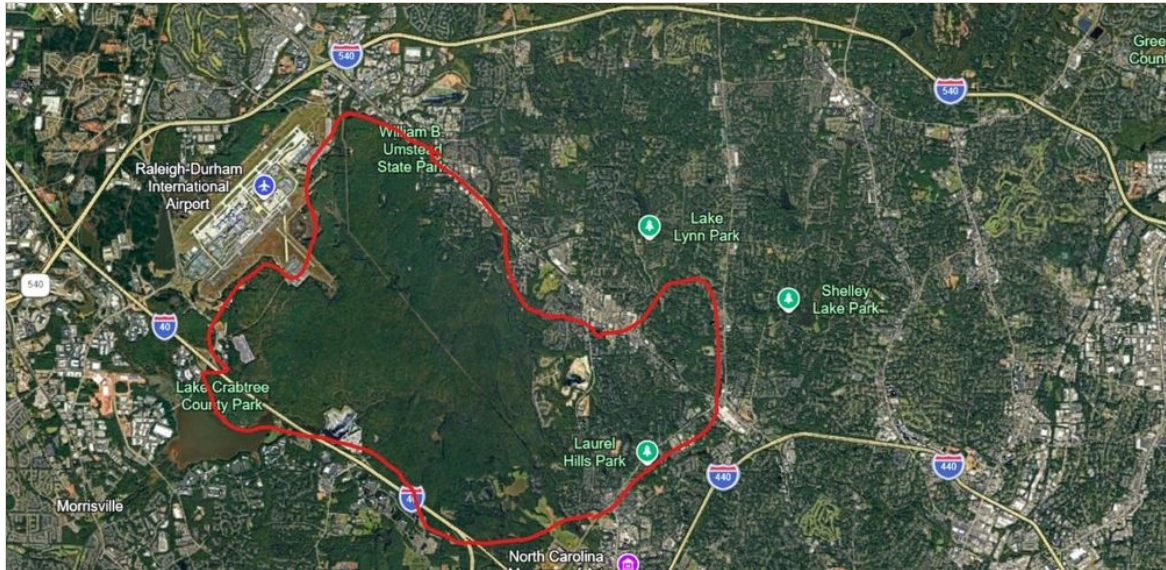


Figure 7. Approximation of the Greater Umstead Ecosystem (modified from Google Earth)

The Greater Umstead Ecosystem developed on the hard metamorphic bedrock foothills of the Raleigh Belt. That becomes clearer from the higher scale North Carolina Terrane Map (excerpt, Figure 8). Raleigh Belt rocks (ancient gneisses and schists) were deformed and realigned, first by the rise of a giant dome of igneous rocks, from 280 to 300 million years ago when the Appalachian Mountains were created, and then by the cataclysm when Africa was pulled off from North America, from 220-235 million years ago, creating the Durham Triassic Basin to the west.

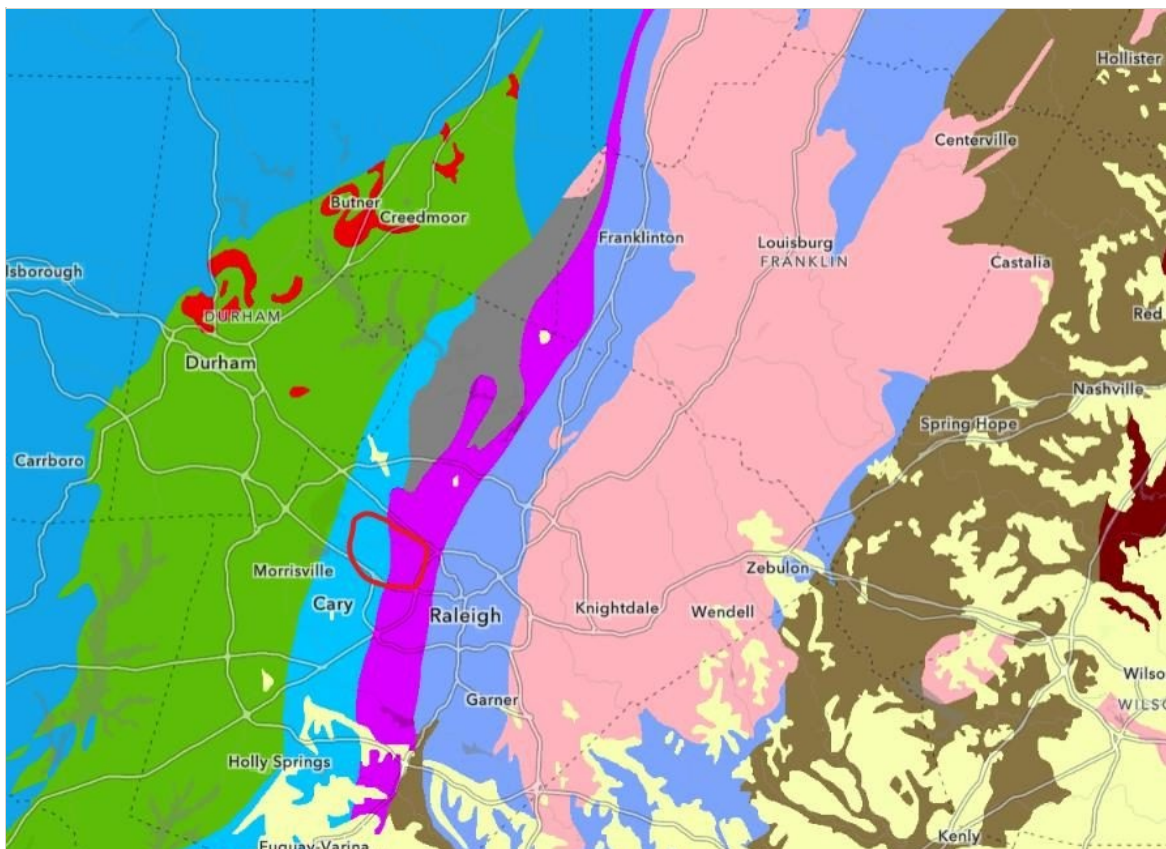


Figure 8. Excerpt from the North Carolina Geologic Terrane Map. Green is the Durham Triassic Basin; coral represents the granite dome; and the blue, pink and purple between are the elements of the Raleigh Belt. The red outline marks the approximate location of the Greater Umstead Ecosystem.

The area drains through tributaries and the mainstream of Crabtree Creek, which has

been cutting down and eroding this landscape for millions of years. The Durham Triassic Basin drains to the south through the Cape Fear Basin.

The peripheral elements of the Greater Umstead Ecosystem are under attack from intensive development. The quarries are obvious threats. The one to the south is clearly in the crosshairs of the Umstead Coalition, and others, and hopefully can be contained. The Duraleigh Quarry is fully contained; the 2014 settlement agreement between the City of Raleigh and Hanson Aggregates (now Heidelberg Materials, a German multinational corporation) phases out all mining – in the current mine footprint – by 2054, or 30 million tons of aggregate produced.

Intensive residential development is the main current threat, especially on the eastern approaches (Figure 9). Two such developments have already been approved and built, the Parc at Laurel Hills Townhomes (built on clearcut land in Laurel Hills) and the MAA Vale Apartments (and Elm Park Townhouses) built on the southside of Crabtree Creek.

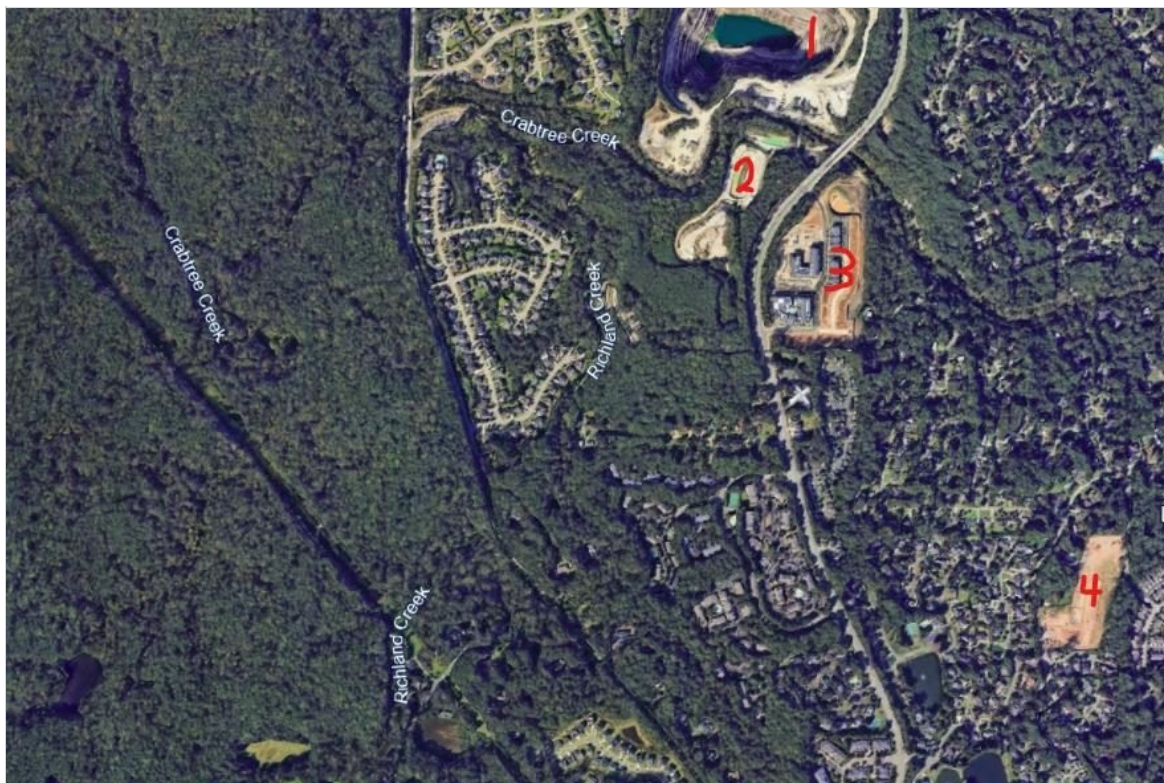


Figure 9. The eastern approaches to Umstead State Park. "1" is the Duraleigh Crabtree Quarry, "2" is the quarry settling ponds, "3" is the MAA Vale Apartments and Elm Park Townhouses, and "4" is the Parc at Laurel Hills Townhouses.

Several additional pieces of forested land exist which could be developed under Raleigh's comprehensive development ordinance. It is high time the way that piecemeal development decisions affecting these higher-order natural resources be recognized and addressed.

The Role of the Greater Umstead East, including Duraleigh Forest, in Protecting Crabtree Creek and the Upper Neuse Basin: A Primer

The Neuse Basin is one of North Carolina's premier watersheds, draining from the Piedmont into Pamlico Sound and the Atlantic Ocean, covering 5,630 square miles. Just the Crabtree Creek portion of this basin covers about 145 square miles.

While a full treatment of the watershed issues related to the Upper Neuse Basin is beyond the scope of this paper, it is nonetheless important to recognize how intensive development in these upstream jurisdictions can radically degrade water quality and ecological integrity downstream, and how humans along the way can be negatively affected.

Hydrology and water relationships are the starting point in understanding these effects. Depending on many factors, an area of forested land delivers considerably less runoff to streams than it does after clearcutting, both on average and during peak flow events like downpours. If covered in impervious surface, the effect is stronger yet again, as infiltration into the soil is reduced or eliminated.

In Crabtree Creek – as part of the Neuse Basin – the three greatest pollutant categories of concern are sediment, nutrients and toxicants. Sedimentation remains poorly controlled in North Carolina, especially during storm events which exceed engineered design specifications. Muddy water is extremely damaging for aquatic life.

That brings us to the issue of toxicants. Crabtree Creek is already stressed by legacy toxicant pollution. There are two serious Superfund designated sites in the Crabtree Basin: the Ward Transformer site at RDU (source of polychlorinated biphenyls), and the Koppers Company wood-treatment site near Morrisville (source of pentachlorophenol, dioxins and other toxicants). These toxicants build up in fish tissue and have resulted in important fish consumption advisories in Crabtree Creek all the way to the Neuse, including as recently as 2026 for all of the waters of Crabtree Creek.

The 5000 Duraleigh site houses a potential legacy pollution problem, addressed in detail in the issue paper on the 1977 Oscar Miller asphalt plant fire on Duraleigh Road. No modern toxicant survey has been done on that site – to our knowledge – but asphalt plants in North Carolina are well known as potential sources of a wide array of persistent and more volatile organic pollutants, including polyaromatic hydrocarbons (PAHs).

If that proves valid, then Crabtree Creek would have been subjected to the unholy triumvirate of PCBs, PCP and PAHs.